Worksheet 3 Iteration

Task 1

1. Complete the trace table to determine the purpose of the following algorithm. Test it with input 14 and 5.

```
x = input ("Enter the first integer: ")
y = input ("Enter the second integer: ")
z = 0
while x > 0
   if x mod 2 == 1 then
      z = z + y
   endif
   x = x div 2
   y = y * 2
endwhile
print ("Answer =", z)
```

x	y	x mod 2	z	x > 0	output
14	5	0	0	True	

2. A doctor records a patient's temperature once an hour for six hours. Any time the temperature is > 37C, an incidence of fever is recorded.

   The average temperature is calculated at the end.

   (a) Calculate the expected result using test data 36, 36, 38.5, 37, 38, 36.

   (b) Complete the trace table using the pseudocode below for this data.

```
temp = 0
fever = 0
total = 0
hour = 1
while hour < 7
    temp = input("Enter temperature: ")
    if temp > 37 then
        fever = fever + 1
    endif
    total = total + temp
    hour = hour + 1
endwhile
average = round(total/hour,1) #round to 1 decimal place
print("Average temperature:", average)
print("Incidents of fever:", fever)
```

temp	fever	total	hour	average	Output
0	1	0	0	0	

   (c) Is the result correct? If not, make changes to the pseudocode so that it gives the correct result.

   (d) Rewrite the pseudocode to include a range check to ensure that a temperature is between 30 and 44. Produce an error message for invalid data. The program should allow the user to re-enter the temperature if it is out of range.

Task 2

3. A parts supply company uses 4-digit part numbers. The last digit indicates the production run. If the production run is 6,7 or 8 it is considered to be an old model.

   Write a pseudocode algorithm that prompts the user to enter a part number.

   The length of the part number should be equal to 4 digits, otherwise an error message will be displayed and the user will be prompted to input the part number again.

   The algorithm should count the total number of parts entered and the number of old model parts and output these totals.

   Data input will terminate when the user inputs 9999.

4. What is a common cause of an accidental infinite loop?

Task 3

5. A teacher has a class of 30 pupils. Each pupil has taken 3 tests during the year. The teacher needs to know the average class score for test1, test2 and test3. She also needs to know the overall average test score for the year. Write an algorithm in pseudocode that will allow the teacher to input all results and print this information.

6. A Hallowe'en display needs a computer controlled light which will flicker. Flicker the light for a random number of seconds between 1/10 and 1/100 of a second. You can use a **pause** function that takes as a parameter the number of milliseconds to pause the program. For example **pause(1000)** will pause the program for 1 second. To turn the light on and off, set the value of light to HIGH for ON and LOW for OFF. The control loop should run continuously.